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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

ZALASKY, KATHERINE M

ART UNIT	PAPER NUMBER
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1797

NOTIFICATION DATE	DELIVERY MODE
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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 10/593,480	Applicant(s) LEE ET AL.	
	Examiner KATHERINE ZALASKY	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 1-13, as amended 17 March 2009, are currently pending.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claims 1-13** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The recitation of "wherein each pair of the at least two pairs of module headers has two module headers inserted into the two module bodies respectively..." in **claim 1** is indefinite because it is not clear how the each pair of two module headers has two additional module headers.

Claim Rejections - 35 USC § 103

3. **Claims 1-7 and 11-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Selbie et al. (US 5,405,528) in view of Zha et al. (US 2003/0178365).

Regarding **claims 1, 12 and 13**, Selbie et al. discloses a submerged hollow fiber large membrane module, comprising:

- two module bodies (Figure 5, bodies 11)
- module support tubes between the two module bodies to keep the two module bodies spaced apart by a predetermined distance (Figure 5, tie bars 103)

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- two plate type module header insertion layers each of which is provided with hollow fiber membrane spaces (Figure 2, potting cage 15), the two plate type module header insertion layer being inserted into the two module bodies respectively to form a permeated water collection space in the module bodies (Figure 2, filtrate housing 31)
- at least two pairs of module headers, each pair of which is provided with a bundle of hollow fiber membranes therebetween (Figures 1 & 2, hollow fibers 14, fixed therein with potting liquid 12)

wherein each pair of the at least two pairs of module headers has two module headers inserted into the two module bodies respectively through the corresponding hollow fiber membrane spaces such that the bundle of hollow fiber membranes are in fluid communication with the permeated water collection space and the module headers inserted into each module body are spaced apart from each other (Figures 1 & 2, filtrate housing 31, C9/L13-20, same arrangement on either end of membranes 14).

Additionally, the reference discloses the submerged hollow fiber membrane module wherein:

- a connecting member for coupling the two submerged hollow fiber membranes modules (Figure 5, header 41, C9/L44-55, C10/L5-14)
- the connecting member has a passage for communicating permeated water and air between the two module headers serially coupled to each other and the diffusion tubes (Figure 1, filtrate discharge passageway 43, C10/L5-14)

Selbie et al. does not disclose two plate type diffusion layers which are provided at an upper portion of the module bodies with an air injection port, the two plate type diffusion layers being inserted into the two module bodies respectively subsequent to the module header insertion layers to form a diffusion space in each of the module bodies and wherein each of the two plate type diffusion layers has diffusion tubes surrounding the bundle of hollow fiber membranes by three sides while being spaced apart by a predetermined distance from the module headers. Further, the reference does not disclose that the connecting member is disposed on the air injection port or that the connecting member has a passage for communicating air between the two module headers serially coupled to each other and the diffusion tubes.

Zha et al. discloses an apparatus for removing fouling materials from hollow fiber membrane modules ([0011]) through the use of a comb-like gas diffuser which may be situated within the membrane module and an air inlet through the header of the module ([0013], Figures 15 & 16). Additionally, the reference discloses that this gas diffuser may be readily applied to the membrane modules of US 5,405,528 to Selbie et al by adding a gas distribution manifold ([0022]).

Selbie et al. and Zha et al. are analogous because both references are directed to hollow fiber membrane modules.

It would have been obvious to one having ordinary skill in the art at the time of the invention to incorporate a comb-like gas diffuser, an air inlet, and a gas distribution manifold into the membrane module of Selbie et al., as taught by Zha et al., since doing

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so provides the module with a cleaning mechanism to remove fouling materials from the membrane.

Regarding **claim 2**, modified Selbie discloses all of the claim limitations as set forth above. Additionally, Selbie et al. discloses the module wherein the permeated water collection space (filtrate housing 31) in the module body is formed between an outside wall of the module body and the plate type module header insertion layer (potting cage 15) inserted into the module body (Figure 2).

Regarding **claim 3**, modified Selbie discloses all of the claim limitations as set forth above. Additionally, Zha et al. discloses the module wherein the diffusion space in the each of the module bodies is formed between the plate type diffusion layer inserted into the module body and an inside wall of the module body ([0013], Figures 15-16, inserted within the module).

Regarding **claims 4-5**, modified Selbie discloses all of the claim limitations as set forth above. While modified Selbie does not explicitly disclose the module wherein an interspace is formed between the permeated water collection space and the diffusion space in each of the module bodies or the module wherein the distance between the module headers and the diffusion tubes arranged adjacent thereto is 1 to 20 cm, it would have been obvious to one having ordinary skill in the art at the time the invention was made to space the gas diffuser 1 to 20 cm from the module header in the apparatus of modified Selbie, as such modification would involve a mere change in configuration. It has been held that a change in configuration of shape of a device is

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obvious, absent persuasive evidence that a particular configuration is significant. In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Regarding **claim 6**, modified Selbie discloses all of the claim limitations as set forth above. Additionally, Zha et al. discloses the module wherein a multiplicity of diffusion holes is formed on the diffusion tubes (Figure 15, [0058])

Regarding **claim 7**, modified Selbie discloses all of the claim limitations as set forth above. Additionally, while Zha et al. does not explicitly disclose the module wherein the diameter of the diffusion holes is 2 mm to 8 mm, the reference does disclose the diameter of the diffusion holes being 0.01 mm to 5 mm ([0058]). It would have been obvious to one of ordinary skill in the art at the time of invention to have selected the overlapping portion of the ranges disclosed by the reference because selection of overlapping portion of ranges has been held to be a prima facie case of obviousness. *In re Malagari*, 182 USPQ 549.

Regarding **claim 11**, modified Selbie discloses all of the claim limitations as set forth above. Additionally, Selbie et al. discloses the module wherein the shape of the module bodies is cylindrical or rectangular (Figure 1, cylindrical).

4. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over Selbie et al. (US 5,405,528) in view of Zha et al. (US 2003/0178365), as applied to **claims 1 and 6** above, and further in view of Cote et al. (US 2002/0139748).

Regarding **claim 8**, modified Selbie discloses all of the claim limitations as set forth above. Modified Selbie does not explicitly disclose wherein the closer the diffusion holes are to the lower part of the module, the larger the diffusion holes are.

Cote et al. discloses a submerged membrane assembly for hollow fiber membranes which has a moving aerator to clean the fibers ([0003], [0019]). Additionally, the reference discloses that the holes in the aerator may be varied in diameter, increasing as they moved farther from the air inlet, in order to improve the air distribution through the assembly ([0047]). Examples teach the diameters increasing approximately 18% and 25% ([0047]).

Selbie et al. and Cote et al. are analogous because both references are directed to hollow fiber membrane modules.

It would have been obvious to one having ordinary skill in the art at the time of the invention to increase the diameter of the diffusion holes as they moved farther from the air inlet in the module of modified Selbie, since doing so may improve the air distribution through the membrane module.

5. **Claims 9-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Selbie et al. (US 5,405,528) in view of Zha et al. (US 2003/0178365), as applied to **claim 1** above, and further in view of Koenhen (US 6,454,943).

Regarding **claims 9-10**, modified Selbie discloses all of the claim limitations as set forth above. Modified Selbie does not disclose the module wherein the tensile strength of the hollow fiber membranes constituting a hollow fiber membrane bundle is higher than 1 kg/piece or wherein the hollow fiber membranes constituting a hollow fiber membrane bundle are composite hollow fiber membranes having a tensile strength higher than 10 kg/piece made by reinforcement by braided fabric.

Koenhen discloses a hollow fiber membrane which may be reinforced with fibers extending the length of the membrane in order to increase the tensile strength and reduce membrane rupture (abstract). Further, the reference discloses that the reinforcing fibers may be formed of multiple twined filaments (C5/L1-15) and that this type of fiber can produce a tensile strength of 45 Kg (Example 1).

Selbie et al. and Koenhen are analogous because both references are directed to hollow fiber membranes.

It would have been obvious to one having ordinary skill in the art to replace the hollow fiber membranes in the module of modified Selbie with reinforced hollow fiber membranes, as taught by Koenhen, since doing so increases the tensile strength of the membranes and reduces rupture.

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. **Claims 1-13** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over **claims 1-11** of copending Application No. 10/579,194 in view of Zha et al. (US 2003/0178365).

Conflicting Application No. 10/579,194 recites all of the claim limitations as the instant application except a plate-type diffusion layer which has diffusion tubes surrounding the bundle of hollow fiber membranes by three surfaces.

Zha et al. discloses a plate-type gas diffuser which may have a comb-like configuration that surrounds the hollow fiber membranes on three surfaces ([0013], Figures 15 & 16). The reference also teaches that this type of gas diffuser is helpful in preventing fouling of the membranes ([0011]).

Copending Application No. 10/579,194 and Zha et al. are analogous because both references are directed to hollow fiber membrane modules with aeration.

It would have been obvious to one having ordinary skill in the art at the time of the invention to use a plate-type gas diffuser which surrounds the hollow fiber membranes on three surfaces in the invention of copending Application No. 10/579,194, as taught by Zha et al., since doing so provides a gas diffuser which is effective to remove fouling materials from the membranes.

This is a provisional obviousness-type double patenting rejection.

Response to Arguments

3. Applicant's arguments filed 17 March 2009 have been fully considered but they are not persuasive.

The Applicant has argued that the references do not teach the limitations of the amended claims. This argument is not found persuasive in view of the rejection presented above.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATHERINE ZALASKY whose telephone number is

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(571) 270-7064. The examiner can normally be reached on Monday-Thursday, 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571)272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KZ/

16 June 2009

/Krishnan S Menon/

Primary Examiner, Art Unit 1797